05

7/13/05

Guertin Elkerton & Associates, Inc.

Engineers and Scientists

LETTER OF TRANSMITTAL

DATE: **7/6/05** PROJECT NO.: **LUNENBURG, MA**

TO: **Ann Herrick**
US EPA
1 Congress Street
Boston, Ma 02114

RE: **Annual Report for the Town of Lunenburg**

We are sending you the following via:

☐ HAND DELIVERY ☐ OVERNIGHT DELIVERY ☐ MAIL

COPIES	DATE	DESCRIPTION
1	7/6/05	**Revised pages 4,6,8 and 12 of the Town of Lunenburg Annual report.**

These are transmitted as checked below:

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☐ AS REQUESTED ☐ RETURNED FOR CORRECTIONS

☐ FOR REVIEW AND COMMENT ☐ FOR BIDS DUE ☐ OTHER -

REMARKS:
Please replace the enclosed pages in the Phase II Annual Report for the Town of Lunenburg, as discussed with Austine Frawley on 7/6/05.

COPY TO: **Jack Rodriquenz**
Town of Lunenburg, DPW

FROM: **Diane E. O'Connor**

91 Montvale Avenue, Stoneham, Massachusetts 02180
Telephone (781) 279-2288 Fax (781) 279-7993
www.geainc.us info@geainc.us

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
1. Public Education and Outreach					
2	Create a Stormwater Program	Board of Selectmen Department of Public Works	Lunenburg will identify appropriate sources of funding assistance (SRF, 319 Grant Program, 604(b) Grant Program, Lakes & Ponds Grant Program, Source Water Protection Grant Program, Recycling Grant Program) and apply for assistance in implementing portions of its Comprehensive Stormwater Management Program, including public education and outreach.	Lunenburg applied and received funding from the DEP Recycling Grant Program for 2005. The Lake Shirley Improvement Corporation prepared a "Lake Shirley Preliminary Stormwater Assessment" in November of 2004. This report was in part intended to evaluate potential project elements for inclusion in a 319 Nonpoint Source Pollution grant application. This report is included with this submittal. The Lake Shirley Improvement Corporation applied for grant assistance from DEP's 319 Nonpoint Source Pollution Grant Program. Funding was requested to map the storm sewer system within the Lake Shirley watershed, install roadside BMPs, replace existing catchbasins with deep sumps and hooded outlets, develop a highway operations and maintenance plan, perform septic system testing adjacent to the lake, and develop a public education and outreach program.	The Town of Lunenburg has requested funds to continue to support the IDDE Program at Town meeting. The Town of Lunenburg will continue to identify funding opportunities to support its protection of local bodies of water.

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1. Public Education and Outreach					
8	Develop, conduct and document educational programs	Board of Selectmen Liaison	The Town of Lunenburg will appoint a liaison to the Nashua River Watershed Association, and the Lake Shirley Improvements Corporation to disseminate information to the Town on programs and activities.	The Town of Lunenburg has appointed a liaison to the Lake Shirley Improvements Corporation to disseminate information to the Town on programs and activities.	The Town of Lunenburg will continue to work with the appointed liaison to the Lake Shirley Improvements Corporation to disseminate information to the Town on programs and activities. The Town of Lunenburg will appoint a liason to the Nashua River Watershed Association.
9	Promote Household Waste Recycling	Department of Public Works Board of Health	The Town of Lunenburg will work with its contracted waste hauler and the Board of Health to continue to promote recycling.	The Town of Lunenburg has contracted with Waste Management through FY05 for roadside waste collection. Waste Management also removes separated products for recycling. The Town of Lunenburg has a drop off site for residents to leave material for composting in the spring and fall.	The Town of Lunenburg expects to continue the waste management program. The Town of Lunenburg is scheduling a hazardous waste day in 2005. The Town of Lunenburg will continue with this composting program each spring and fall.

3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
3. Illicit Discharge Detection and Elimination					
BMP ID #	Inventory and mapping of storm drain system	Department of Public Works	Lunenburg will identify appropriate sources of funding assistance (SRF, 319 Grant Program, 604(b) Grant Program, Lakes & Ponds Grant Program, Source Water Protection Grant Program, Recycling Grant Program) and apply for assistance in implementing portions of Lunenburg's Comprehensive Stormwater Management Program, including public education and outreach.	Through Town funding the Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town reviewed and inventoried all available plan data to support mapping of the storm drain system. Lunenburg applied and received funding from the DEP Recycling Grant Program for 2005. The Lake Shirley Improvement Corporation prepared a "Lake Shirley Preliminary Stormwater Assessment" in November of 2004. This report was in part intended to evaluate potential project elements for inclusion in a 319 Nonpoint Source Pollution grant application. This report is included with this submittal. The Lake Shirley Improvement Corporation applied for grant assistance from DEP's 319 Nonpoint Source Pollution Grant Program. Funding was requested to map the storm sewer system within the Lake Shirley watershed, install roadside BMPs, replace existing catchbasins with deep sumps and hooded outlets, develop a highway operations and maintenance plan, perform septic system testing adjacent to the lake, and develop a public education and outreach program.	The Town of Lunenburg has requested funds to continue to support the IDDE Program at Town meeting. The Town of Lunenburg will continue to identify funding opportunities to support its protection of local bodies of water.

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3. Illicit Discharge Detection and Elimination					
19	Watershed assessments and studies	Department of Public Works Conservation Commission Board of Health	Lunenburg will identify opportunities for funding assistance from DEP's 604(b) and 319 grant programs and the Department of environmental Management's Lakes and Ponds Grant Program to support watershed assessment and implementation activities. Tasks can include design and installation of stormwater BMPs and public outreach including storm drain stenciling. Emphasis will be on assessments and remediation of stormwater related problems.	The Lake Shirley Improvement Corporation applied for grant assistance from DEP's 319 Nonpoint Source Pollution Grant Program. Funding was requested to map the storm sewer system within the Lake Shirley watershed, install roadside BMPs, replace exiting catchbasins with deep sumps and hooded outlets, develop a highway operations and maintenance plan, perform septic system testing adjacent to the Lake, and develop a public education and outreach program. The Lake Shirley Improvement Corporation prepared a "Lake Shirley Preliminary Stormwater Assessment" in November of 2004. This report was in part intended to evaluate potential project elements for inclusion in a 319 Nonpoint Source Pollution grant application.	The Town of Lunenburg will continue to identify funding opportunities to support its protection of local bodies of water.

Municipality/Organization:	Town of Lunenburg
EPA NPDES Permit Number:	1906
MaDEP Transmittal Number:	W- 040561
Annual Report Number & Reporting Period:	**No. 2: March 04- April 05**

NPDES PII Small MS4 General Permit Annual Report

Part I. General Information

Contact Person: Jack Rodriquenz	Title: DPW Director
Telephone #: 1-978-582-4152	Email: lundpw@gis.net

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: John M Rodriquenz

Printed Name: John M Rodriquenz

Title: D.P.W. Director

Date: 5/10/05

Part II. Self-Assessment

The Town of Lunenburg has successfully implemented or begun implementation of several Measurable Goals noted in its Notice of Intent. Prior to the development of Lunenburg's Comprehensive Stormwater Management Program, including Measurable Goals, the Town had an assessment performed of current activities, programs, and regulations that could support the NPDES Phase II Stormwater program. This assessment became the basis for modifying current activities, recommending new programs, and informing town boards and departments of their obligation toward successful implementation of Lunenburg's Comprehensive Stormwater Program.

Despite successful implementation of several programs and projects in this second year of the permit, Lunenburg has not yet organized a government-wide coordination. A vacancy in the position of Town Administrator in the past year has delayed implementation of a multi-department effort to achieve compliance. It is anticipated that the appointment of a permanent full-time town administrator will provide the necessary point of coordination.

In accordance with Lunenburg's Comprehensive Stormwater Management Program the Town completed an Illicit Discharge Detection and Elimination (IDDE) Program in Permit Year 2. Included in this submission is Section 6 from Lunenburg's IDDE Plan that describes proposed IDDE tasks and schedule.

Lunenburg is pleased to present the following summary describing its success at implementing the second year of the town's Comprehensive Stormwater Management Program.

Part III. Summary of Minimum Control Measures

1. Public Education and Outreach

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
1. Public Education and Outreach					
1	Create a Stormwater Program	Department of Public Works Planning Board Conservation Commission Board of Health Board of Selectmen	Lunenburg will present its Comprehensive Stormwater Management Program to the public at a public meeting.	The Town of Lunenburg has completed *Stormwater Management Phase II Assessment* report. Copies are available for review by town departments and the public. The Town of Lunenburg did schedule a public meeting to review the *Stormwater Management Phase II Assessment* report. Unfortunately the meeting did not take place.	The Town of Lunenburg will schedule another public meeting to review its Comprehensive Stormwater Program.

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2	Create a Stormwater Program	Board of Selectmen Department of Public Works	Lunenburg will identify appropriate sources of funding assistance (SRF, 319 Grant Program, 604(b) Grant Program, Lakes & Ponds Grant Program, Source Water Protection Grant Program, Recycling Grant Program) and apply for assistance in implementing portions of its Comprehensive Stormwater Management Program, including public education and outreach.	Lunenburg applied and received funding from the DEP Recycling Grant Program for 2005. The Lake Shirley Improvement Corporation prepared a "Lake Shirley Preliminary Stormwater Assessment" in November of 2004. This report was in part intended to evaluate potential project elements for inclusion in a 319 Nonpoint Source Pollution grant application. This report is included with this submittal. The Hickory Hills Landowners, Inc. applied for grant assistance from DEP's 319 Nonpoint Source Pollution Grant Program. Funding was requested to map the storm sewer system within the Hickory Hills Lake watershed, install roadside BMPs, replace existing catchbasins with deep sumps and hooded outlets, develop a highway operations and maintenance plan, perform septic system testing adjacent to the lake, and develop a public education and outreach program.	The Town of Lunenburg has requested funds to continue to support the IDDE Program at Town meeting. The Town of Lunenburg will continue to identify funding opportunities to support its protection of local bodies of water.

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1. Public Education and Outreach					
3	Address specific groups	Board of Selectmen Department of Public Works	Distribute EPA and other relevant educational brochures to targeted audiences. Distribution points include Town Hall, Library, and Transfer Station.	The Town of Lunenburg is in receipt of EPA educational materials on disk for easy printing and distribution	Brochures will be printed and made available at town buildings.
4	Target groups likely to impact storm water	Board of Selectmen Department of Public Works	Brochures targeting specific audiences and activities will be available. These target groups include homeowner and lawn maintenance activities, disposal of household waste, and pet maintenance.	The Town of Lunenburg is in receipt of EPA educational materials on disk for easy printing and distribution	Brochures will be printed and made available at town buildings.
5	Identify alternative information sources	Board of Selectmen MIS Department	Lunenburg will post links to stormwater BMPs and other water quality education resources, including EPA and DEP on its website: www.Lunenburg@net1plus.com	Lunenburg has not posted links to EPA or DEP website.	Links to EPA and DEP will be added to website.
6	Identify alternative information sources	Board of Selectmen MIS Department	Lunenburg will also post links on its website to the Nashua River Watershed Association @ www.nashuariverwatershed.org, and the Lake Shirley Improvements Corporation @ www.lakeshirley.com	Lunenburg has posted a link to The Lake Shirley Improvement Corporation website. Additional links on the Town's website include *Environmental Education for Kids.*	Lunenburg will post links on its website to the Nashua River Watershed Association @ www.nashuariverwatershed.org, and the Lake Shirley Improvements Corporation @ www.lakeshirley.com Additional links will be reviewed for relevancy.
7	Utilize local website	Board of Selectmen	Public meeting notice for the meeting reviewing Lunenburg's Comprehensive Stormwater Management Program will be posted on Lunenburg's website.	Meeting not yet held –re-scheduled for Permit Year 3.	Notice of storm water presentation will be posted on the Town's website.

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9	Promote Household Waste Recycling	Department of Public Works Board of Health	The Town of Lunenburg will work with its contracted waste hauler and the Board of Health to continue to promote recycling.	The Town of Lunenburg has contracted with Waste Management through FY05 for roadside waste collection. Waste Management also removes separated products for recycling. The Town of Lunenburg had a hazardous waste day in 2004. The Town of Lunenburg has a drop off site for residents to leave material for composting in the spring and fall.	The Town of Lunenburg expects to continue the waste management program. The Town of Lunenburg is scheduling a hazardous waste day in 2005. The Town of Lunenburg will continue with this composting program each spring and fall.

2. Public Involvement and Participation

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
2. Public Involvement and Participation					
10	Storm drain stenciling	Department of Public Works	Lunenburg will work with local lake and Scout groups to develop a stenciling program. Stenciling will target Lunenburg's subwatersheds.	No activity Permit Year 2.	Town of Lunenburg will identify partners in developing and implementing a storm drain stenciling project.
11	Community clean-ups	Department of Public Works Lunenburg Conservation Commission	Town of Lunenburg will encourage local stream team cleanups with local residents and area Scout groups. Town will provide solicitation of sponsors and notice of events on local access channel and website.	Hickory Hills Landowners, Inc. performs regular clean-up and maintenance activities around Hickory Hills Lake.	Hickory Hills and Lake Shirley improvement corporations will continue cleanups. Expansion of cleanups to include scouts, students, and other civic groups will be encouraged.
12	Community clean-ups	Department of Public Works	Town will provide trucks and other material to support cleanup efforts and disposal of materials.	Town of Lunenburg Little League organized trash cleanup of town ball-fields, Spring 04. DPW picked up and disposed of collected trash.	Little League performs cleanup every spring. Youth Group from the new Chester Mossman Teen Center is scheduling a clean-up of the center of town.

3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
3. Illicit Discharge Detection and Elimination					
BMP ID #	Inventory and mapping of storm drain system	Department of Public Works	Lunenburg will identify appropriate sources of funding assistance (SRF, 319 Grant Program, 604(b) Grant Program, Lakes & Ponds Grant Program, Source Water Protection Grant Program, Recycling Grant Program) and apply for assistance in implementing portions of Lunenburg's Comprehensive Stormwater Management Program, including public education and outreach.	Through Town funding the Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town reviewed and inventoried all available plan data to support mapping of the storm drain system. Lunenburg applied and received funding from the DEP Recycling Grant Program for 2005. The Lake Shirley Improvement Corporation prepared a "Lake Shirley Preliminary Stormwater Assessment" in November of 2004. This report was in part intended to evaluate potential project elements for inclusion in a 319 Nonpoint Source Pollution grant application. This report is included with this submittal. The Hickory Hills Landowners, Inc. applied for grant assistance from DEP's 319 Nonpoint Source Pollution Grant Program. Funding was requested to map the storm sewer system within the Hickory Hills Lake watershed, install roadside BMPs, replace existing catchbasins with deep sumps and hooded outlets, develop a highway operations and maintenance plan, perform septic system testing adjacent to the lake, and develop a public education and outreach program.	The Town of Lunenburg has requested funds to continue to support the IDDE Program at Town meeting. The Town of Lunenburg will continue to identify funding opportunities to support its protection of local bodies of water.

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3. Illicit Discharge Detection and Elimination					
14	Mapping and identification of outfalls and receiving waters	Department of Public Works Board of Assessors	Lunenburg will develop and implement a plan to map all outfalls and receiving bodies of water, contingent on Town Meeting approval of funding.	The Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town created a GIS base map. Utilizing existing plan data and information gathered in field survey the process of mapping existing outfalls on the GIS base map has begun. Additionally the Town created a database describing the location of all outfalls and the names of all waters that receive discharges from those outfalls. The database of existing outfalls is included in this submission. Outfalls identified during field survey were digitally photographed.	The Town will continue the process of mapping existing outfalls on the GIS base map. The Town will update the database describing the location of all outfalls and the names of all waters that receive discharges from those outfalls contingent on funding from Town Meeting.

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3. Illicit Discharge Detection and Elimination					
15	Identification/description of problem areas	Department of Public Works	Lunenburg will develop and implement an Illicit Discharge Detection and Elimination (IDDE) plan, contingent on Town Meeting approval of funding.	The Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town prioritized areas of town for potential sources of Illicit Discharges Based upon the following "hot spots" presented in the NEIWPC's *Illicit Discharge Detection and Elimination Manual*: • Commercial/Industrial areas • Older areas of Town • Areas where there have been repeated complaints • Locations identified from ambient water quality sampling.	The Town of Lunenburg has requested funding for Town Meeting approval to support the implementation of the IDDE Plan. As part of the IDDE Program, the Town of Lunenburg will GPS survey outfalls and identify potential sources of illicit discharges beginning with prioritized areas identified in the IDDE Plan.
16	Enforcement procedures addressing illicit discharges	Planning Board Town Counsel Board of Health	Lunenburg will review whether local authority is appropriate and able to respond to potential illicit discharges. New by-laws, if necessary, will be proposed to Town Meeting.	The Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town has collected a variety of model bylaws that could be included in local by-laws for review.	Lunenburg will review whether local authority is appropriate and able to respond to potential illicit discharges. New by-laws, if necessary, will be proposed to Town Meeting.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
3. Illicit Discharge Detection and Elimination					
17	Public information program regarding hazardous wastes and dumping	Department of Public Works Board of Health	Lunenburg will provide educational brochures to residents promoting proper disposal of household hazardous wastes and conditions for regional collections.	The Town of Lunenburg website contains information regarding separation of trash and schedule for collections	The Town of Lunenburg expects to continue to maintain website information. The Town of Lunenburg will develop brochures or handouts.
18	Initiation of recycling programs	Planning Board Board of Health	Lunenburg will apply for funding assistance from DEP's Recycling Grant Program for assistance in public education and the purchase of recycling materials.	The Town of Lunenburg applied for and received a 2005 DEP municipal recycling grant. This grant will provide outreach material to the community.	The Town of Lunenburg will continue to apply for DEP's Recycling Grant Program. This grant will provide outreach material to the community.

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3. Illicit Discharge Detection and Elimination					
19	Watershed assessments and studies	Department of Public Works Conservation Commission Board of Health	Lunenburg will identify opportunities for funding assistance from DEP's 604(b) and 319 grant programs and the Department of environmental Management's Lakes and Ponds Grant Program to support watershed assessment and implementation activities. Tasks can include design and installation of stormwater BMPs and public outreach including storm drain stenciling. Emphasis will be on assessments and remediation of stormwater related problems.	The Hickory Hills Landowners, Inc. applied for grant assistance from DEP's 319 Nonpoint Source Pollution Grant Program. Funding was requested to map the storm sewer system within the Hickory Hills Lake watershed, install roadside BMPs, replace exiting catchbasins with deep sumps and hooded outlets, develop a highway operations and maintenance plan, perform septic system testing adjacent to the Lake, and develop a public education and outreach program. The Lake Shirley Improvement Corporation prepared a "Lake Shirley Preliminary Stormwater Assessment" in November of 2004. This report was in part intended to evaluate potential project elements for inclusion in a 319 Nonpoint Source Pollution grant application.	The Town of Lunenburg will continue to identify funding opportunities to support its protection of local bodies of water.

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3. Illicit Discharge Detection and Elimination					
20	Watershed assessments and studies	Department of Public Works Water Department	The Town of Lunenburg will apply for funding assistance from DEP's Source Water Protection Program for grant assistance to develop wellhead protection plans and stormwater management plans within Zones II in Lunenburg.	The Lunenburg Water District has not received any funding from the DEP's Source Water Protection Program.	The Town of Lunenburg will ascertain the availability of funds from the Water Protection Program in Permit Year 3.

4. Construction Site Stormwater Runoff Control

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
21	Bylaw: Storm water management regulations for construction sites 1 acre or larger	Planning Board Conservation Commission Town Counsel Board of Health Zoning Board of Appeals	Lunenburg will review model by-law developed by DEP in consultation with the Attorney General's Office.	The Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town has collected a variety of model bylaws that could be included in local by-laws for review.	Lunenburg will review whether local authority is appropriate. New by-laws, if necessary, will be proposed to Town Meeting.

5. Post-Construction Stormwater Management in New Development and Redevelopment

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
22	Bylaw: Require post-construction runoff controls	Planning Board Conservation Commission Town Counsel Board of Health Zoning Board of Appeals	Lunenburg will review model by-law developed by DEP in consultation with the Attorney General's Office.	The Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town has collected a variety of model bylaws that could be included in local by-laws for review.	Lunenburg will review whether local authority is appropriate. New by-laws, if necessary, will be proposed to Town Meeting.

6. Pollution Prevention and Good Housekeeping in Municipal Operations

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 2 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year 3
6. Pollution Prevention and Good Housekeeping in Municipal Operations					
23	Develop a municipal Operations and Maintenance Plan	Department of Public Works	Using regulations and recommendations from DEP and EPA, Lunenburg will develop and update an operations and maintenance plan to include proper disposal of street sweepings, catchbasin cleanout, snow disposal, roadway de-icing procedures, vehicle washing, and outside storage of materials.	The Town of Lunenburg adopted a Stormwater Pollution Prevention Plan (SWPPP) for its highway facilities. Plan includes BMPs for reference by all public works employees. The Town of Lunenburg outsourced catch basin and drain cleaning and jetting in permit year 2.	The Town of Lunenburg will re-initiate dialogue with DEP and develop a plan for the re-use and disposal of street sweepings and catch basin cleanout. The Town of Lunenburg DPW is requesting funding for a catch basin cleaner.
24	Develop a municipal Operations and Maintenance Plan	Department of Public Works	Lunenburg will implement a formal inspection program, including maintenance logs and scheduling, for catchbasin cleaning, repairs, and new installation.	The Town of Lunenburg has completed an *Illicit Discharge Detection and Elimination (IDDE) Program* as part of the Town's Comprehensive Stormwater Management Program. As part of the IDDE Program, the Town has a summary of recommendations developed as water quality-friendly maintenance practices, EPA and DEP Fact Sheets pertaining to Municipal Operations and Maintenance.	The Town of Lunenburg will continue to use BMPs and the O&M schedule as applicable. The Town has a catch basin cleaning inspection form.

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6. Pollution Prevention and Good Housekeeping in Municipal Operations					
25	Develop and implement training programs for municipal employees	Department of Public Works	Lunenburg will send a minimum of 3 public works employees annually to training seminars sponsored by MassHighway, BayState Roads, and other relevant agencies or vendors.	Educational literature is available at the Town of Lunenburg Department of Public Works. The Town was not able to send employees to relevant stormwater prevention seminars and forums.	Town will attempt to send employees to relevant stormwater prevention seminars and forums.

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6. Pollution Prevention and Good Housekeeping in Municipal Operations					
26	Review storm drainage infrastructure needs	Department of Public Works	Lunenburg will incorporate storm drain infrastructure review in Lunenburg's Chapter 90 project utilizations.	The Town of Lunenburg has secured SRF assistance to support a $12 million sewer extension project and received an additional $1.2 million in PWED grants for roadway and drainage improvements. Title 5 issues constitute the water quality threat that is driving sewer expansion throughout the community. Chapter 90 roadway improvements funds are used to support resurfacing and drainage improvements within the sewer project area. The Public Works Department rebuilt an outlet from a swamp area. The Public Works Department replaced twelve catch basins with deep sump catch basins. The Town of Lunenburg collaborated with the Track & Field Association to incorporate BMPs in the Association's new fields. Applied to state for extension of PWED grants for roadway and drainage improvements.	The Town of Lunenburg will continue to support roadway drainage improvements as part of an overall infrastructure improvements program. The Town of Lunenburg will review potential to apply for additional SRF Funds at Town Meeting for the second phase of the sewer project.

7. BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA) *<<if applicable>>*

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				No TMDLs in the Town of Lunenburg	

7a. Additions

7b. WLA Assessment

Part IV. Summary of Information Collected and Analyzed

Sampling and analysis has not been performed.

Part V. Program Outputs & Accomplishments (OPTIONAL)

Programmatic

Stormwater management position created/staffed	(y/n)	
Annual program budget/expenditures	($)	

Education, Involvement, and Training

Estimated number of residents reached by education program(s)	(# or %)	
Stormwater management committee established	(y/n)	
Stream teams established or supported	(# or y/n)	
Shoreline clean-up participation or quantity of shoreline miles cleaned	(y/n or mi.)	
Household Hazardous Waste Collection Days		
▪ days sponsored	(#)	
▪ community participation	(%)	
▪ material collected	(tons or gal)	
School curricula implemented	(y/n)	

Legal/Regulatory

	In Place Prior to Phase II	Under Review	Drafted	Adopted
Regulatory Mechanism Status (indicate with "X")				
▪ Illicit Discharge Detection & Elimination				
▪ Erosion & Sediment Control				
▪ Post-Development Stormwater Management				
Accompanying Regulation Status (indicate with "X")				
▪ Illicit Discharge Detection & Elimination				
▪ Erosion & Sediment Control				
▪ Post-Development Stormwater Management				

Mapping and Illicit Discharges

Outfall mapping complete	(%)	
Estimated or actual number of outfalls	(#)	
System-Wide mapping complete	(%)	
Mapping method(s)		
▪ Paper/Mylar	(%)	
▪ CADD	(%)	
▪ GIS	(%)	
Outfalls inspected/screened	(# or %)	
Illicit discharges identified	(#)	
Illicit connections removed	(#) (est. gpd)	
% of population on sewer	(%)	
% of population on septic systems	(%)	

Construction

Number of construction starts (>1-acre)	(#)	
Estimated percentage of construction starts adequately regulated for erosion and sediment control	(%)	
Site inspections completed	(# or %)	
Tickets/Stop work orders issued	(# or %)	
Fines collected	(# and $)	
Complaints/concerns received from public	(#)	

Post-Development Stormwater Management

Estimated percentage of development/redevelopment projects adequately regulated for post-construction stormwater control	(%)	
Site inspections completed	(# or %)	
Estimated volume of stormwater recharged	(gpy)	

Operations and Maintenance

Average frequency of catch basin cleaning (non-commercial/non-arterial streets)	(times/yr)	
Average frequency of catch basin cleaning (commercial/arterial or other critical streets)	(times/yr)	
Total number of structures cleaned	(#)	
Storm drain cleaned	(LF or mi.)	
Qty. of screenings/debris removed from storm sewer infrastructure	(lbs. or tons)	
Disposal or use of sweepings (landfill, POTW, compost, recycle for sand, beneficial use, etc.)		
Cost of screenings disposal	($)	

Average frequency of street sweeping (non-commercial/non-arterial streets)	(times/yr)	

Average frequency of street sweeping (commercial/arterial or other critical streets)	(times/yr)	
Qty. of sand/debris collected by sweeping	(lbs. or tons)	
Disposal of sweepings (landfill, POTW, compost, beneficial use, etc.)	(location)	
Cost of sweepings disposal	($)	
Vacuum street sweepers purchased/leased	(#)	
Vacuum street sweepers specified in contracts	(y/n)	

Reduction in application on public land of: ("N/A" = never used; "100%" = elimination)		
▪ Fertilizers	(lbs. or %)	
▪ Herbicides	(lbs. or %)	
▪ Pesticides	(lbs. or %)	

Anti-/De-Icing products and ratios	% NaCl % $CaCl_2$ % $MgCl_2$ % CMA % Kac % KCl % Sand	
Pre-wetting techniques utilized	(y/n)	
Manual control spreaders used	(y/n)	
Automatic or Zero-velocity spreaders used	(y/n)	
Estimated net reduction in typical year salt application	(lbs. or %)	
Salt pile(s) covered in storage shed(s)	(y/n)	
Storage shed(s) in design or under construction	(y/n)	

6. IDDE Program Implementation

6.1 Coordination with Town Departments

A successful Stormwater Management Program depends on the participation of all Town departments, local businesses, local environmental action groups, and all Town residents. The ongoing implementation of Lunenburg's Illicit Discharge Detection and Elimination (IDDE) Program requires the Town to complete the mapping of all storm sewer outfalls, inspect all outfalls for dry-weather flows, identify and remove the source of illicit and illegal discharges, adopt and enforce by-laws prohibiting illicit discharges to Lunenburg's storm sewer system, and educate local businesses and residents on the dangers of illegal dumping.

Lunenburg's Notice of Intent identified Measurable Goals that require championing by several municipal departments. The Board of Health schedules local hazardous waste collection days, thereby reducing the likelihood of illegal dumping. The Conservation Commission enforces the Massachusetts Department of Environmental Protection's Stormwater Management Policy. Phase II, however, requires Lunenburg to develop, implement, and enforce a program to reduce pollutants in stormwater runoff from construction activities that disturb equal to or greater than one acre of land. Lunenburg is also required to develop, implement, and enforce a program to reduce pollutants in post-construction runoff from construction activities that disturb equal to or greater than one acre of land. Participation by Planning Boards, Conservation Commissions, Building Inspectors, and Boards of Health are integral to the successful adoption and enforcement of these programs.

Education of and participation by Lunenburg's residents are vital in successfully protecting Lunenburg's local bodies of water and drinking water supply. Lunenburg can provide for the distribution of educational materials regarding the impact on water quality of residential activities such as lawn fertilizing, disposal of household wastes, vehicle washing, and pet waste disposal. These materials are available from the Environmental Protection Agency's (EPA) website at www.epa.gov and Massachusetts Department of Environmental Protection Agency's website at www.state.ma.us/dep. Distribution opportunities include Town Meetings, School Activities, Transfer Station, Library, and local businesses.

The education and participation of local boards, committees, and the general public is crucial to the successful appropriation of resources and the successful adoption and enforcement of local water quality protection regulations.

Stormwater workshops for Town employees, public review of Lunenburg's Comprehensive Stormwater Management Program, and the creation of a stormwater committee can contribute to the successful implementation of Lunenburg's stormwater program, including Lunenburg's Illicit Discharge Detection and Elimination (IDDE) Program.

6.2 Annual Requirements and Reporting

The Town of Lunenburg is required to prepare an Annual Report. In Massachusetts, reports must be filed annually with EPA and DEP on May 1st in years 2004 through 2008 (inclusive). Appendix D contains Lunenburg's first Annual Report.

6.3 IDDE Program

6.3.1 Town-Wide Base Mapping

In Phase 1 of Lunenburg's Illicit Discharge Detection and Elimination Program (IDDE) Guertin Elkerton & Associates, Inc. (GE&A) developed a Town-wide map using available information from Massachusetts Geographic Information Systems (MassGIS). These maps prioritize drainage basins within the Town of Lunenburg for investigation of potential illicit discharges. Mapping layers used to generate these maps include the following:

Town boundary (scale 1:12,000)

Hydrological features (scale 1:25,000).

Land use (scale 1:25,000).

Major basins (scale 1:24,000)

Sub-Basins (scale 1:24,000)

Soil Characteristics (scale 1:25,000)

TIGER Census 2000 Roads (1:100,000)

In order to inventory the existing storm sewer system GE&A proposes that a map book be created. This Map Book would divide the Town into ~12 tiles at a scale of 1" = 400'. Each tile will be presented as a 24" x 36" sheet. Using available Town data mapping layers and additional MassGIS data, the map book may include the following:

Town parcel map data

Massachusetts Highway Department (MHD) Roads (scale 1:100,000),

Roads and trails (scale 1:5000),

Train lines (scale 1:5000),

Topographic contours (scale 1:5000 or 3 meter intervals)

A description of data layers is available at http://www.mass.gov/mgis/laylist.htm.

This will provide GE&A with a base map upon which all subsequent data collected will be mapped.

Deliverable: A Map Book showing a base map for the entire Town of Lunenburg at a scale of 1" = 400', and corresponding electronic files (.pdf).

6.3.2 Develop Stormwater GIS from Existing Data

Guertin Elkerton & Associates, Inc. proposes to complete the review of source documents begun in Phase 1 of the IDDE Program development. This task will identify locations of outfalls, catchbasins, and manholes based on available town maps and plans as well as any plans kept at GE&A. After relevant plans have been reviewed and stormwater structures have been mapped, GE&A will hold a meeting with relevant Town staff to review map features to that point. Any additional information that Town staff can provide regarding the location of storm sewer infrastructure will be sketched in by hand. This will expedite the field mapping and outfall inspection component of this project.

The estimated number of structures in Lunenburg's storm sewer system is:

Outfalls: 100

Manholes: 200

Catchbasins: 1700

The map book will be updated to include stormwater features found in the Town inventory of record drawings as well as the approximate locations of stormwater infrastructure as identified by Town staff.

Deliverable: An updated Map Book showing approximate locations of stormwater structures and corresponding electronic files (.pdf, .shp).

6.3.3 Field Verification

Guertin Elkerton & Associates, Inc. proposes to locate stormwater structures identified in Section 6.3.2 of this report using Global Positioning System (GPS) technology. Based on the supplied estimates of structures a plan for the field verification process will be supplied with an estimate of 15 days of field work. GPS collection will be conducted at better than 1:100 scale accuracy using appropriate hardware and software. This GPS and database collection hardware and software will be delivered to the Town at the end of the collection program. This will enable the town to continue collecting features and updating the GIS database afer the project is completed.

The location, as collected by GPS, of outfalls, catchbasins, and manholes in the storm sewer system will be presented in an updated map book along with a data table with northings, eastings and elevations based on the Massachussets Mainland State Plan coordinate system, which is recognized and used by the Massachusetts Highway Department. All data collected during this task can be readily incorporated into existing GIS efforts.

Deliverable: An updated Map Book and data table presenting GPS surveyed locations of stormwater structures and corresponding electronic files (.pdf, .shp).

6.3.4 Integration of Stormwater GIS to WebGIS

Guertin Elkerton & Associates, Inc. proposes to coordinate the integration of the newly developed Stormwater GIS layers with the Town WebGIS. GE&A would oversee the delivery and incorporation of Stormwater GIS data layers with the Town's current WebGIS consultant. This would require ensuring file format compatibility and appropriate data presentation for a successful and useful merger into the existing Town WebGIS.

Deliverable: An updated WebGIS system that represents new Stormwater GIS.

6.3.5 Outfall Inspections

Guertin Elkerton & Associates, Inc. proposes to perform outfall field inspections for the purpose of identifying potential illicit connections to the stormwater system.

The following data will be obtained or verified for each outfall:

Structure Type

Size

Material

Condition

Observable Flow

Signs of Illicit Connections

GE&A will attempt a visit to each location once, on the assumption that outfall location survey and inspection can be conducted simultaneously. If an outfall is inaccessible, this fact will be noted.

As required by the Phase II Stormwater Program, GE&A will provide the Town of Lunenburg a table listing all outfalls with an outfall ID #, location, and receiving water body. In addition, information regarding the outfall will be documented along with photographs of the outfall. During a field visit to Lunenburg on October 6, 2004 two outfalls were inspected. Results from these inspections can be found in Appendix A.

Deliverable: A tabulated inventory of outfalls, with photographs and inspection summaries for each outfall.

6.3.6 Identify Potential Sources of Illicit Discharges

In Phase 1, Guertin Elkerton & Associates, Inc. prepared a map of the Town of Lunenburg showing receiving bodies of water and drainage basins and identified potential "hot spots" using land use activities and local knowledge. In Task 6.3.4 dry weather flows from outfalls will be observed for odor, color, turbidity, floatable matter, stains, vegetation, and damage to outfall structure. Flows may also be sampled for the presence of fecal coliform.

Since the number of flowing outfalls (if any) is unknown, a budget is recommended for sampling and other procedures in an attempt to identify and remove the source of the illicit discharge. Other procedures may include manhole and up the pipe storm drain inspections, dye testing, video, inspection, and smoke testing. Efforts beyond what is feasible within the original budget will be described in section 6.3.6

Deliverable: A report documenting the attempts to identify and eliminate sources of illicit discharge.

6.3.7 Plan to Follow-Up on Dry Weather Flows

Guertin Elkerton & Associates, Inc. proposes to prepare a plan with recommendations and costs for additional follow-up to investigate sources of dry-weather flows. The plan will serve as a resource document for the Town to use when future dry weather flows are identified.

The plan will include the following:

Inspection and documentation procedures

Sampling and analysis procedures to verify if dry weather flows are contaminated

Procedures and estimated costs to pinpoint illicit discharges.

Procedures include:

Notification process

Manhole and up the pipe storm drain inspections

Dye testing

Video inspection

Smoke testing

Summary of identified illicit discharges, the specific tasks recommended for follow-up, and estimated implementation costs.

Guertin Elkerton & Associates, Inc. proposes to review the plan with appropriate local officials. GE&A will present the plan and the results of mapping and outfall inspection at a public meeting. Five copies of the plan will be provided to the Town.

Deliverable: A plan administering courses of action for the elimination of illicit discharges not addressed in 6.3.6 and in the future.

6.3.8 Public Outreach and Education

Guertin Elkerton & Associates, Inc. proposes to facilitate a stormwater work session with relevant Town departments. The NPDES Phase II Comprehensive Stormwater Management Program requires the participation of multiple Town departments in order to be successful. The Board of Selectmen, Department of Public Works, Board of Health, Conservation Commission, Planning Board, Emergency Response, and

other Town departments play critical roles in insuring the protection of local water quality.

Lunenburg's Comprehensive Stormwater Management Program will be reviewed with emphasis on the Town's Measurable Goals, schedule of implementation, and responsible departments.

Literature and brochures reviewing stormwater best management practices (BMPs) prepared by environmental agencies or associations will be distributed at the work session. Departments can copy and distribute to the public at large.

Deliverable: Workshops and literature reviewing stormwater best management practices.

6.3.9 Illicit Discharge and BMP By-Laws

Guertin Elkerton & Associates, Inc. proposes to review with the Town, the Town's desire to secure professional assistance in the development of local by-laws and regulations prohibiting illicit discharges into the storm sewer system. If GE&A's assistance is desired, GE&A will submit a proposed budget reflecting the requested level of services.

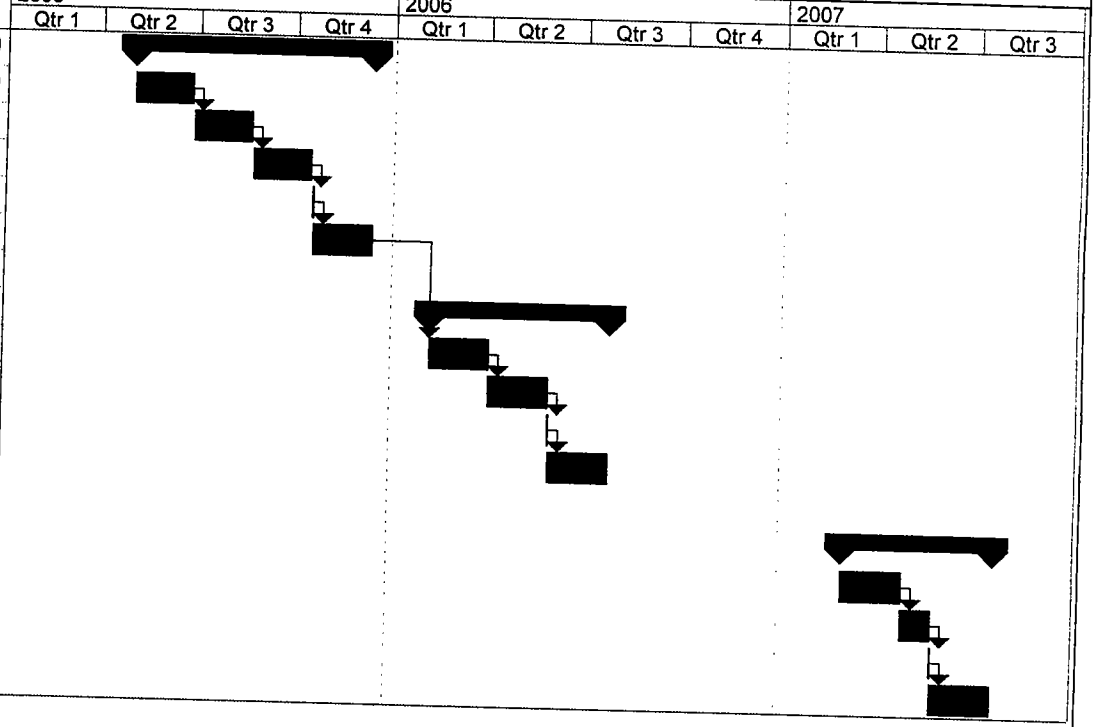
6.3.10 Annual Report

Guertin Elkerton & Associates, Inc. proposes to assist the Town in the preparation and submission of Lunenburg's Stormwater Annual Report to the Environmental Protection Agency and the Massachusetts Department of Environmental Protection due annually on May 1.

Deliverable: A report submitted to both MADEP and EPA describing the Town of Lunenburg's success at implementing the Comprehensive Stormwater Management Program.

TOWN OF LUNENBURG, MASSACHUSETTS
PROPOSED PHASED APPROACH TO STORMWATER COMPLIANCE PROGRAM

ID	Task Name	Estimated Cost
1	**Phase I**	**$23,000**
2	Base Mapping	$2,500
3	Develop Stormwater GIS (map based)	$9,500
4	GPS Field Verification	$6,500
5	Stormwater Workshop	$2,000
6	Prepare Annual Report	$2,500
7		
8	**Phase II**	**$22,000**
9	GPS Field verification cont'd	$7,500
10	Outfall Inspections	$10,000
11	Stormwater Workshop	$2,000
12	Prepare Annual Report	$2,500
13		
14	**Phase III**	**$23,500**
15	Identify Potential DWF sources	$14,000
16	Dry weather flow follow up plan	$5,000
17	Stormwater Workshop	$2,000
18	Prepare Annual Report	$2,500



Project: Phased Recommendations LUN - Date: Tue 12/21/04

Task

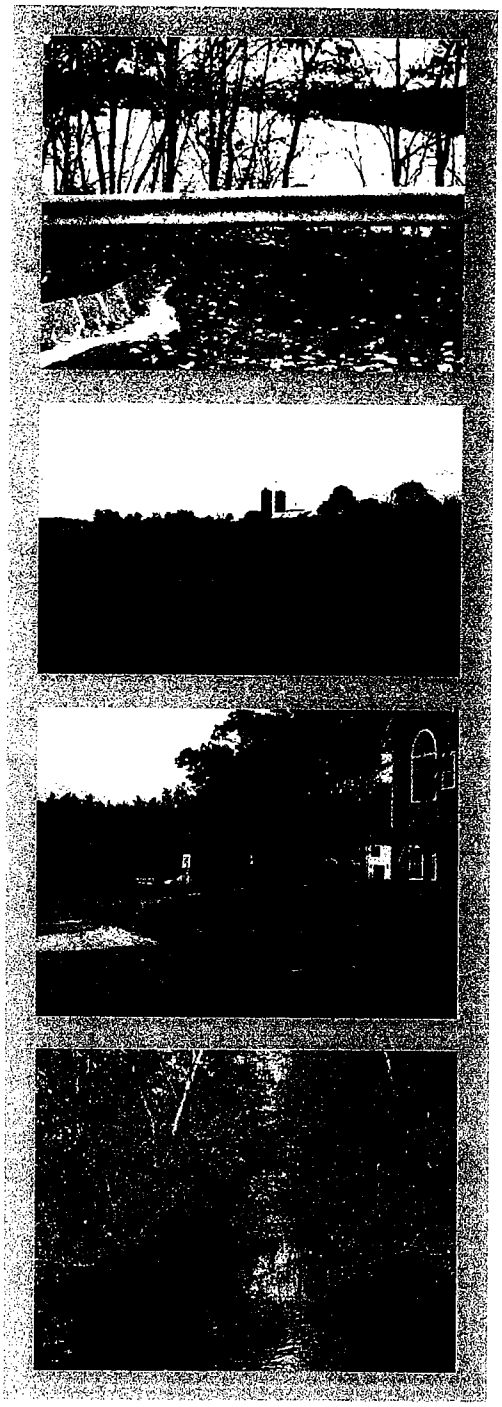
Summary

S:/53269.00/Phased Recommendations LUN

GUERTIN ELKERTON & ASSOCIATES, INC.

LAKE SHIRLEY
PRELIMINARY STORMWATER ASSESSMENT

November 22, 2004



PREPARED FOR:

LAKE SHIRLEY
IMPROVEMENT CORPORATION

PREPARED BY:

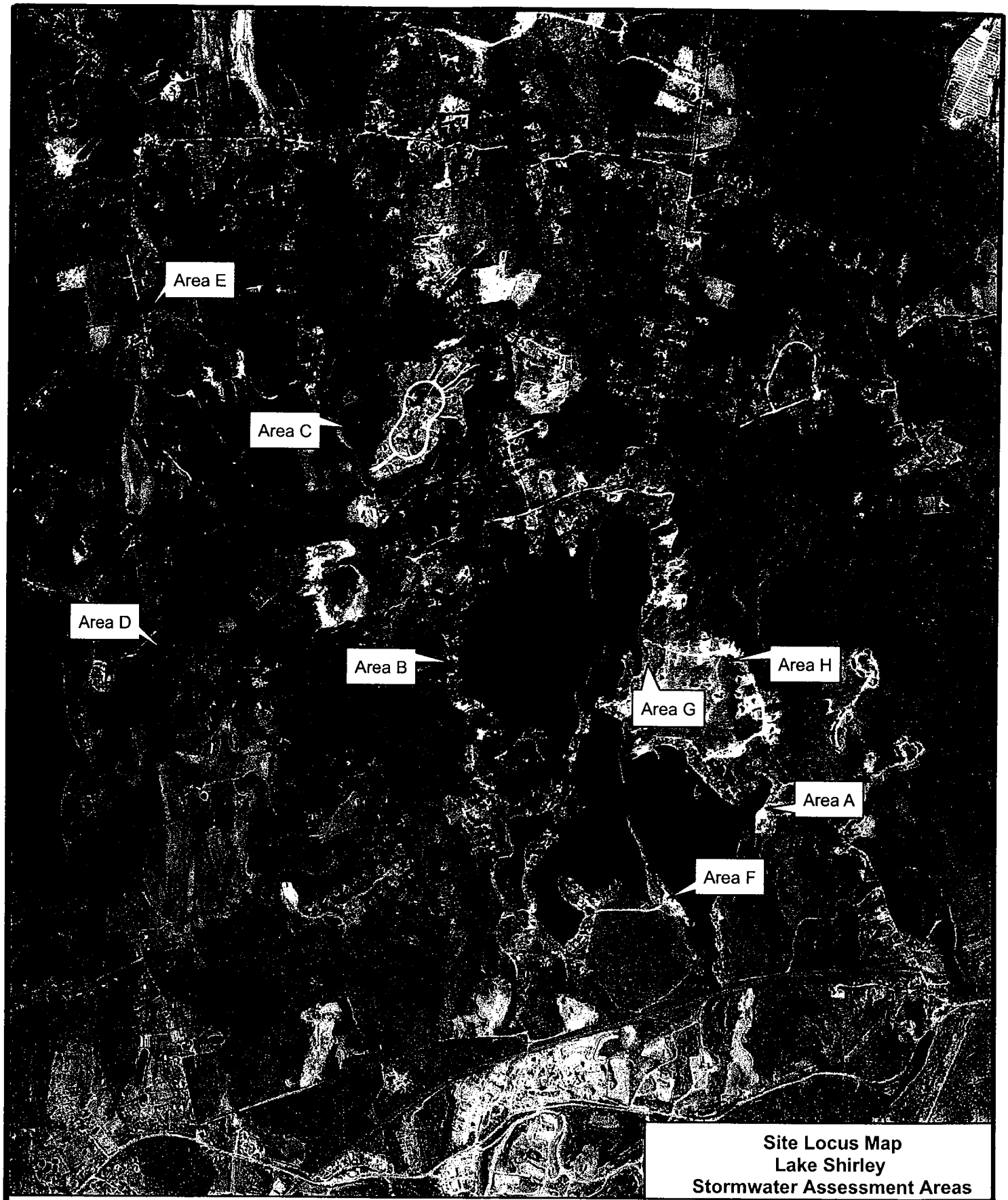
GEOSYNTEC CONSULTANTS
289 Great Road, Suite 105
Acton, MA 01720
(978) 263-9588 www.geosyntec.com

SECTION 1: INTRODUCTION

GeoSyntec Consultants was contracted by the Lake Shirley Improvement Corporation (LSIC) to conduct field investigations and provide a preliminary assessment of potential stormwater management improvements in the Lake Shirley watershed. In addition to providing general stormwater management recommendations, this investigation was also intended to evaluate potential project elements for inclusion in a Section 319 Nonpoint Source Pollution grant application. Section 319 grants are federal (EPA) funds distributed annually through the Massachusetts Department of Environmental Protection, intended primarily for implementation of projects to reduce nonpoint sources of pollution. These grants require a 40% local match which can be provided as either cash or in-kind services (e.g. volunteer labor, labor from Town DPW staff, etc.).

Steven Roy (Associate) and Bob Hartzel (Senior Water Resources Scientist) of GeoSyntec conducted site investigations throughout the Lake Shirley watershed on October 25, 2004. GeoSyntec's assessment and management recommendations are provided in Section 2. An aerial orthophoto map (Exhibit A) is provided on the following page, showing the major areas of investigation described in Section 2.

A large wetland area within the Catacoonamug Brook watershed. Wetland areas such as this provide significant storage and attenuation of nutrients and pollutants within the Catacoonamug Brook and Easter Brook subwatersheds, which together comprise 82% of the Lake's total watershed area.



Site Locus Map
Lake Shirley
Stormwater Assessment Areas

3,000 1,500 0 Feet

GeoSyntec Consultants

ACTON, MASSACHUSETTS

DATE: 11/22/04

FILE: lake shirley stormwater.mxd

SECTION 2: ASSESSMENT AND RECOMMENDATIONS

2.1 Construction Erosion and Sedimentation Controls

Sediment-laden runoff from construction sites can be a significant source of impairment for surface waters and wetlands. GeoSyntec's site investigation on October 25, 2004 documented two construction sites adjacent to Lake Shirley where sediment and erosion controls were either absent or virtually absent:

Photo 1, Area A: Uncontrolled runoff and large piles of erosive material throughout site.

Area A: Area A is , shown in Photos 1-3, is the residential subdivision being constructed off of Catacoonamug Road, including an area which abuts Lake Shirley near the dam. This area is located in Shirley, just east of the Lunenburg/Shirley town line. This 10-12 house subdivision is almost entirely lacking in standard sediment and erosion control practices, despite having large piles of erosive earthen materials throughout the site, in immediate proximity to Lake Shirley and other protected wetland areas. In fact, as shown below in Photo 3, two dilapidated sections of silt fence (in an area immediately adjacent to Lake Shirley) were the only sediment/erosion controls documented on site during the field investigation.

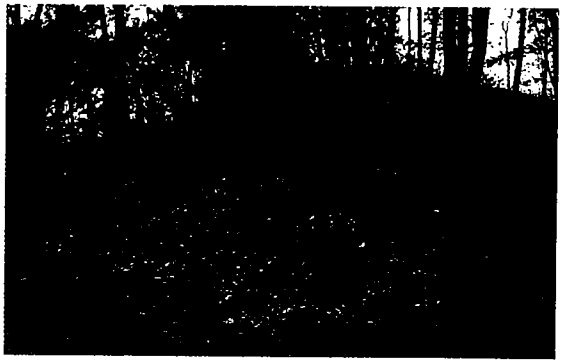


Photo 2, Area A: Eroding cut slope immediately adjacent to a wetland area.

The conditions documented by GeoSyntec on the date of the site investigation represented, at the very least, a violation of the Massachusetts Wetlands Protection Act. As a construction site over 1 acre in size, this site should also be operating under a federal (EPA) NPDES Construction Permit. It seemed apparent that erosion controls had been deficient at this site for an extended

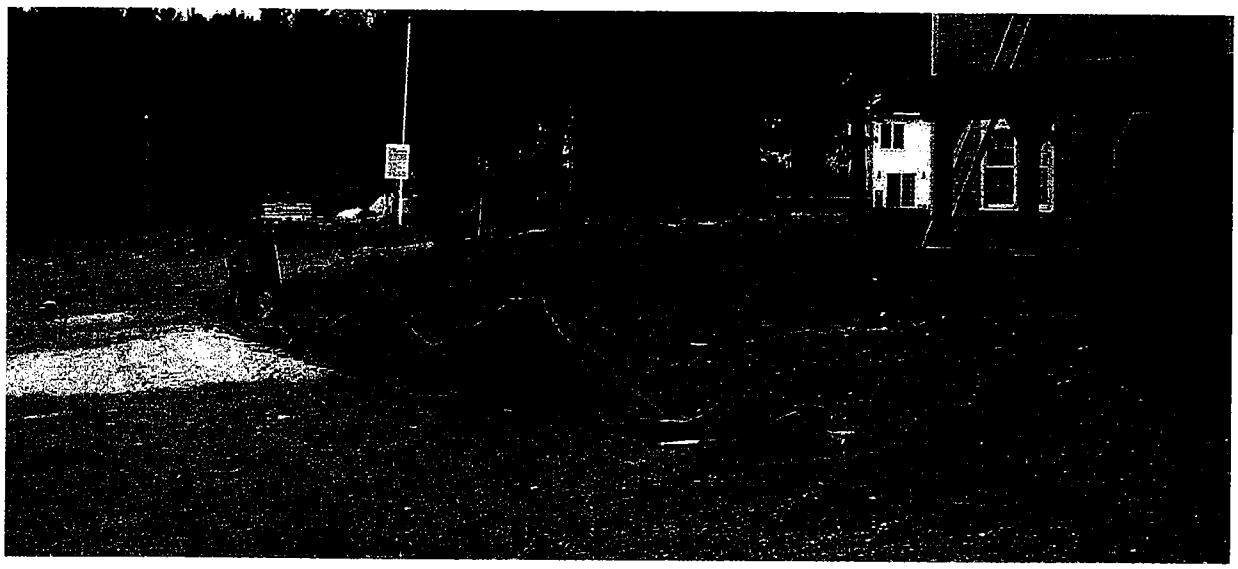


Photo 3, Area A: Two dilapidated sections of silt fence were the only erosion controls found on the site.

period, raising questions about the frequency and effectiveness of the Town's construction inspection and enforcement protocols. At a minimum, sites of this nature should have a detailed sediment and erosion control plan on record as part of the Order of Conditions issued by the Conservation Commission through the Wetlands Protection Act (WPA) permitting process. An enforcement order can be issued by the Conservation Commission, who may also levy fines for violations and require the property owner to pay for periodic environmental compliance monitoring.

Area B: As shown in Photo 4, Area B is a lot on the west side of Reservoir Road, across from Lake Shirley's northern basin. As of October 25th, the lot had been recently cleared, with exposed soil on moderately steep slopes over most of its area. No erosion/sedimentation controls were in place, allowing sediment-laden runoff from this area to flow directly across Reservoir Road and into the Lake. Given its proximity the lake, disturbed soils on a site such as this should be stabilized as quickly a possible with some form of mulch. In addition, a line of properly installed haybales and silt fence should be placed around the toe of slope (or just upgradient of the roadway). As stated above, the lack of erosion controls in such a visible location raises questions about the Town's construction inspection/enforcement protocols.

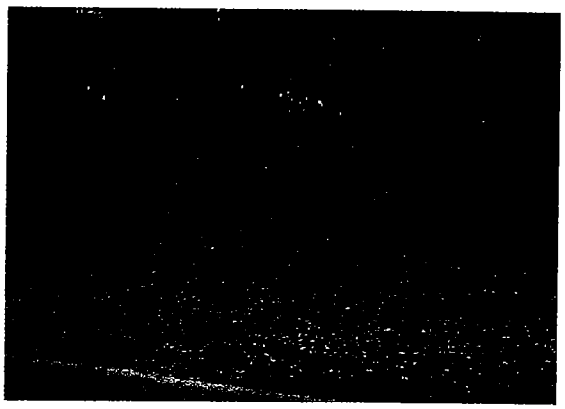


Photo 4, Area B: Clear cut lot with no sediment/erosion controls, on Reservoir Road., across from the Lake's north basin.

Area C: On a positive note, a residential home construction site further north on Reservoir Road provided a good example of a well-managed construction site with regard to erosion and sediment controls. As shown in Photo 5, this site (Area C) had well-maintained silt fencing around all downgradient wetland areas, and also had a stone construction entrance in place to minimize vehicle transport of sediment to Reservoir Road.

Photo 5, Area C: Example of residential construction with appropriate sediment/erosion controls, including stone construction entrance and well-maintained silt fence.

2.1.1 Recommendations: Construction Erosion and Sedimentation Control

Section 319 grant funds could be used for development of regulatory and education/training tools to help the towns of Lunenburg and Shirley improve protocols related to construction site erosion/sedimentation control. Specific tasks could include:

1. Develop a standard **construction site inspection checklist** for use on all projects;
2. Develop **erosion and sedimentation control policy guidance** for Conservation Commission use;
3. Conduct a series of **training workshops** for both local officials and developers working in the towns.

The cost of the tasks listed above is estimated between $15,000 and $25,000, depending on the specific scope of work for each task.

2.2 Agricultural Best Management Practices

Two agricultural areas adjacent to Lake Shirley's tributaries were identified during the site investigation as offering potential opportunities for stormwater runoff improvements. The descriptions provided below only reflect conditions visible from public roads, and is *not* intended to reflect the full range of potential stormwater management practices that could be considered on privately owned farmland within the watershed.

Photo 6, Area D: Stillman Dairy Farm

Stillman Dairy Farm (Area D): The Stillman Dairy Farm is located to the east and north of Massapoag Pond. From the Massapoag Pond outlet, water flows in an unnamed tributary along the southern edge of the farm's active pasture land, then continues flowing to the northeast where it joins Catacoonamug Brook just to the west of Reservoir Road. As shown in Photo 7, an extensive section of the cow pasture has an inadequate buffer for water quality protection, allowing cows to graze right up to the water's edge. Fencing and an increased buffer width would allow for improved attenuation of nutrient and bacteria loading to the tributary from cow droppings. An interception swale could also be considered for this area, just upgradient of the stream corridor and its bordering wetland area, to allow detention and infiltration of surface runoff.

Photo 7, Area D: Stillman Dairy Farm – cow pasture with inadequate buffer, adjacent to a tributary of Catacoonamug Brook.

Misty Meadow Farm (Area E): Misty Meadow Farm is located both to the east and west of where Catacoonamug Brook crosses under Lancaster Avenue. As shown in Photo 8, the Brook is bordered by a very narrow shrub buffer for most of its length across the farm. At the time of the site inspection, it appeared that this area of the farm was used as a hay field. It is unknown if fertilizers and/or pesticides are used (or are planned to be used) on this land in such a way that would justify a recommendation for increasing the existing buffer width.

Photo 8, Area E: Misty Meadow Farm – narrow shrub buffer through hay field.

2.2.1 Recommendations: Agricultural Best Management Practices (BMPs)

Section 319 funds could be used for the following tasks related to agricultural BMPs:

1. Install **fencing and shub/tree buffer plantings** at priority locations such as Stillman Farm.
2. Conduct a detailed **nutrient management assessment** related to all agricultural sites in the watershed. This assessment could involve a development of more accurate nutrient runoff estimates, based on field sampling and a site-by-site assessment of ongoing practices related to nutrient

management, manure/fertilizer application, the number of livestock on site, etc.

3. In coordination with the USDA-Natural Resources Conservation Service (NRCS), coordinate a series of meetings with local farmers to highlight stormwater management issues and facilitate federal funding for improvements via NRCS and the EQUIP grants program.
4. Through coordination with farmers, NRCS and other organizations, identify all funding opportunities for watershed-wide agricultural BMPs, both to construct/install BMPs and obtain funds to offset any reduction in usable land (e.g. the Conservation Reserve Program).

The estimated cost for the tasks listed above could range from $20,000-30,000, with the biggest variable being the extent of BMP installation/construction (fencing, buffer plantings etc.).

2.3 Bioretention/Infiltration Techniques

Low-Impact Development (LID) stormwater management is an approach that reduces stormwater impacts through a variety of small-scale techniques that are distributed throughout a watershed. LID techniques aim to *mimic pre-development hydrology* by using small-scale practices that infiltrate, evaporate and transpire rainwater. These techniques can be incorporated directly into the design of new developments, or can be retrofit into existing developed areas, often replacing or enhancing direct pipe discharges to waterbodies such as Lake Shirley.

Bioretention Cells are shallow landscaped depressions that incorporate plantings and an engineered soil mixture with a high infiltration rate. Bioretention cells are used to control runoff volume and timing, and can remove pollutants through the physical, chemical and biological processes that occur in plants, soil, and mulch. Stormwater that drains to the bioretention cell will be ponded in a shallow depression and then quickly percolate thorough a porous planting media. Bioretention cells are typically designed with the capacity to provide infiltration at the peak discharge rate of storms less than or equal to the 10-year, 24-hour storm. Infiltration rates are further enhanced by vegetative uptake from plantings within the cell, which will provide additional uptake through evapotranspiration. Example bioretention cell details are provided on page 9.

Bioretention facilities designed as described above have been shown to provide exceptional water quality benefits and are consistent with the Low Impact Development (LID) approach to stormwater management which is being promoted by the Massachusetts DEP.

Costs for engineering, design, materials and construction of a typical bioretention cell are estimated at approximately $3,000 - $6,000, depending on size and the complexity of the location. Pre-fabricated bioretention "boxes" (e.g. Filterra™) can treat runoff from a .25-acre area and cost approximately $7,000 each (installed price).

Raingardens are shallow vegetated depressions designed to slow stormwater runoff and allow infiltration into the ground. Raingardens are used primarily on residential lots to treat stormwater from relatively small areas. The cost of a typical raingarden is $1,800-$2,000.

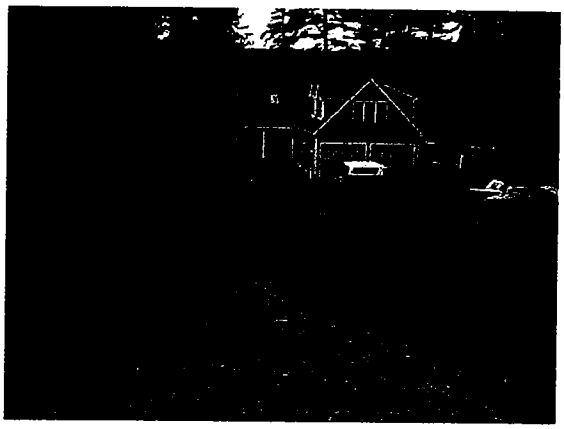
Photo 9, Area F: Ruth Road (end of road) – Potential site for a bioretention cell.

Photo 10, Area G: Sunset Road - Potential site for a bioretention cell.

Photo 11, Area H: Robbs Hill Rd. – example of an infiltrating/leaching area. This BMP reduces runoff and provides baseflow, but does not provide the biological uptake function of a planted bioretention cell.

Infiltration Techniques for Driveways, Parking Areas, Boat Launch Areas, etc.:

As with any impervious surface, paved driveways, parking areas, boat launch area and paved areas immediately adjacent to the lake allow for rapid stormwater runoff and transport of associated sediment and pollutants. Options for improving infiltration and stormwater runoff quality from these types of impervious areas include the following:



- **Porous pavers** (i.e. Uni Eco-Stone, Infiltra), installed price of $15 per square foot. The cost of porous pavers can also be reduced by installing the pavers in alternating bands with a typical paved surface such as asphalt.
- **Porous asphalt,** installed price of $25 per square foot.
- **Reinforced gravel paving system** (i.e. GravelPave), installed cost $8.50 per square foot.
- A pre-cast **infiltrating trench drain** can be installed across sloped roadways or driveways to intercept storm runoff, improving infiltration and capturing fine sediments before they reach the lake. Estimated installed cost for one trench drain=$4,500 ($3,000 if installed by Town DPW).

The unit costs listed above do not include the estimated cost of removing and disposing of an existing asphalt surface. Example images of the techniques listed above are provided on page 10.

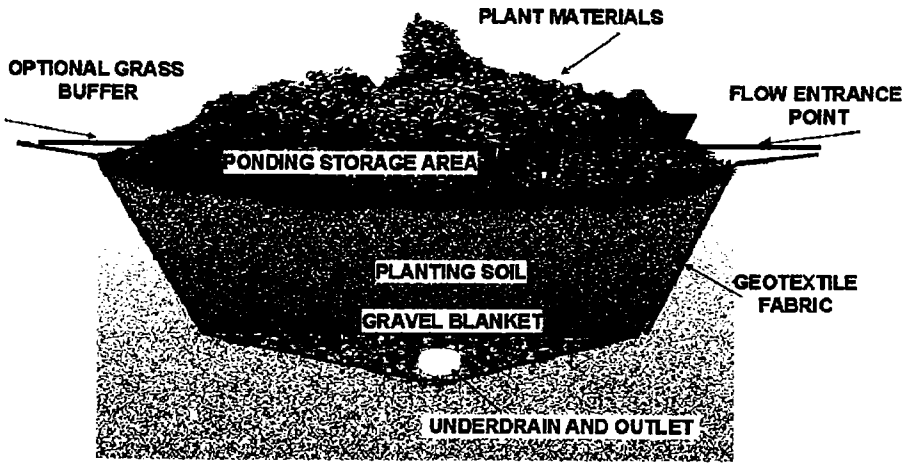
2.3.1 Recommendations: Bioretention/Infiltration Techniques

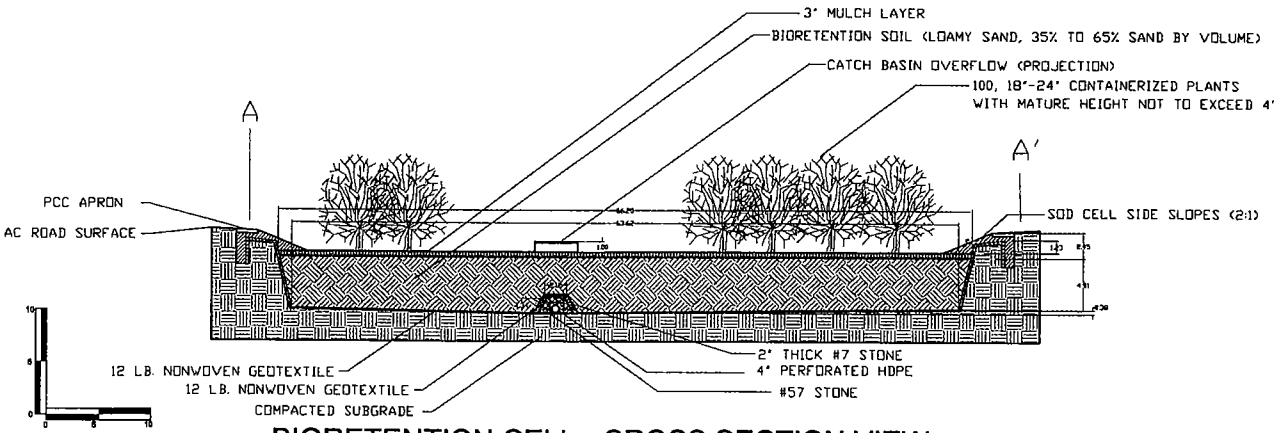
Section 319 funds can be used for the tasks related to bioretention and infiltration techniques listed below. Costs for each project element are variable based on the number of sites selected. The number of sites should be finalized based on the projected total project budget, as determined by available local matching funds.

1. Develop **technical guidance and policy guidance documents** to assist the Town of Lunenburg with incorporating LID techniques into future developments. The Town of Franklin, MA recently completed a similar effort, which is now an important component of their site plan review process.
2. Install **2-4 bioretention cells** at several locations within the proximal watershed of Lake Shirley, including Area F (Ruth Road) and Area G (Sunset Road).
3. As a demonstration project for watershed homeowners, **4-6 driveways** (or other suitable paved areas) could be retrofit with porous pavers, GravelPave, and other appropriate techniques.
4. As a demonstration project for watershed homeowners, **4-6 raingardens** could be constructed on private properties. Funds allowing, more sites could be added.
5. A public education campaign could be developed based on the LID demonstration sites described above, including public education workshops, LID "watershed tours" and a public education brochure for all residents of the watershed.

Bioretention Conceptual Details/Schematics

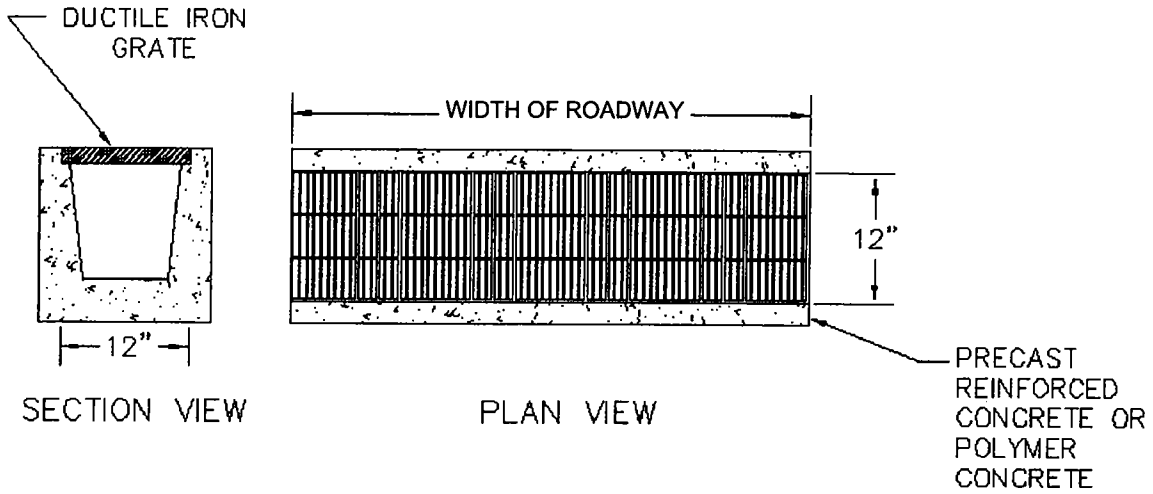
Bioretention Cell Example Photos and Cross-Section Details

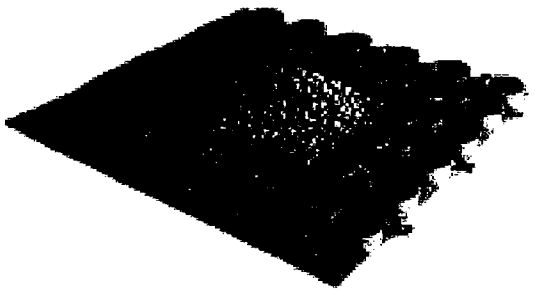




BIORETENTION CELL - CROSS SECTION VIEW

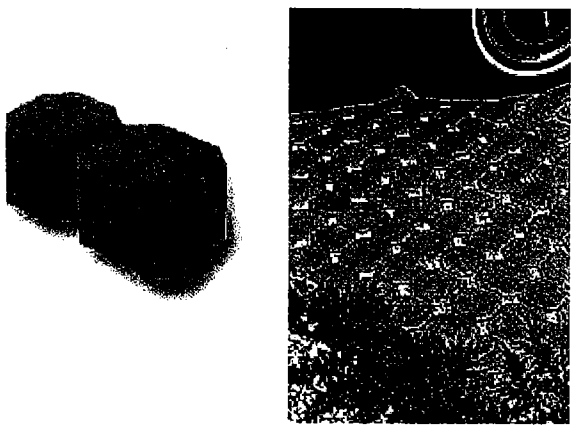
Infiltration Trench Drain Details





Section of GravelPave reinforced gravel paving system

GravelPave installation



Uni Eco-Stone porous paving system

Porous asphalt (installed on right side of yellow median line)